

RESOURCE ALLOCATION SIMULATION IN THE COMMUNITY COLLEGE:
A COMPARATIVE ANALYSIS MODEL

by
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A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL OF
THE UNIVERSITY OF FLORIDA
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

ACKNOWLEDGMENTS

The author would like first to acknowledge the unselfish contribution of time, energy, ideas, and patience by his doctoral committee members: Dr. James L. Wattenbarger, Chairman; Dr. John M. Nickens; and Dr. John H. James.

Additionally, the author would like to express appreciation to the professional persons who participated in the study as respondents.

Lastly, the author would like to express his heartfelt thanks to his family Terry, Gordon, and Alison for their unwavering love, encouragement, and patience throughout the entire graduate process.

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Abstract of Dissertation Presented to the
Graduate Council of the University of Florida
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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June, 1977

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Major Department: Educational Administration

This study identified parameters in theoretical literature on general administration, decision making, and simulation research studies used for construction of a comparative analysis model which can be used to evaluate educational resource allocation simulation models.

The study was conducted in the following five phases:

- I. Review of literature related to this topic.
- II. Development of a resource allocation simulation comparative analysis model (MODEL) using results of the literature search.
- III. Field-testing of the MODEL using expert opinion of officers presently in charge of or recently exposed to resource allocation simulation models in institutions of higher education across the nation.

- IV. Validation of the MODEL by selected community college presidents who are known to utilize modern management techniques in the daily operation of their institutions.
- V. Assessment of the results of the MODEL field-test and validation.

The following observations were reached through this investigation:

1. The construction of a single-best all-purpose resource allocation simulation comparative analysis model is too narrow an approach to the problem.
2. The use of expert opinion as a means of evaluation, when the experiences which qualify the person as expert are centered upon a single resource allocation simulation model, elicits answers obviously influenced by that experience.
3. The use of general, rather than specific, terms in the MODEL leads to confusion of the user.
4. A structured MODEL may be followed more easily than a MODEL leaving greater latitude for interpretation by the user.
5. The MODEL as presented in Appendix B was determined to be acceptable for use by a committee of experts. Individuals interested in resource allocation simulation will find the MODEL useful.

CHAPTER I

INTRODUCTION

This investigation deals with the theory of administration, its relation to the decision making process, and how these concepts, implemented through modern management techniques, can assist the educational administrator in identifying and choosing the course of action most beneficial to the educational entity.

Basic to the investigation were four assumptions:

1. Central to any defensible theory of administration is the process of decision making;
2. The process of decision making includes making a choice among alternatives;
3. In making a choice among alternatives, analytic techniques, including simulation models, can assist the decision maker;
4. The viability of analytic techniques, including simulation models, must be determined by practicing educational administrators prior to implementation.

The first assumption (that central to any defensible theory of administration is the process of decision making) is generally supported by most theoreticians, including Barnard, Drucker, Griffiths, Halpin, Hearn, Livingston, McCammy, and Simon.

For example, in 1959 Griffiths published Administrative Theory, a volume written as "an interim statement setting forth the understandings (of administration) we now have" (p. v). Griffiths expanded the definition of theory as set forth by Herbert Feigl. Feigl defined theory as "a set of assumptions from which can be derived by purely logico-mathematical procedures a larger set of empirical laws" (Griffiths, 1959, p. 71).

Using Feigl's definition of theory, Griffiths formulated a set of four basic assumptions to explain the nature of administration:

1. Administration is a generalized type of behavior to be found in all human organizations.
2. Administration is the process of directing and controlling life in a social organization.
3. The specific function of administration is to develop and regulate the decision-making process in the most effective manner possible.
4. The administrator works with groups or with individuals with a group referent, not with individuals as such. (1959, pp. 71-74)

Chester I. Barnard, one of the first authors to present a comprehensive theory of cooperative behavior in formal and informal organization, viewed decision making as the fulcrum about which administrative theory turns. In 1938, Barnard succinctly defined the relative position of the administrator in the decision making process. According to Barnard, (1938, p. 211) "it is the organization, not the executive, which does the work on the external environment. The executive is primarily concerned with

decisions which facilitate or hinder other decisions in the effective or efficient operation of the organization."

Herbert A. Simon (1957, p. 240) noted that the analysis of the decision making process was necessary to enable one better to understand principles of administration.

Peter F. Drucker (1967, p. 113) viewed decision making as "the specific executive task." Judgment and the ability to choose among various alternatives in light of relevance were also key requirements.

In 1971, Stufflebeam, Foley, Gephart, Guba, Hammond, Merriman, and Provus envisioned decision making as an integral part of their definition of evaluation:

Educational evaluation is the process of delineating, obtaining, and providing useful information for judgment decision alternatives. (p. 40)

Stufflebeam et al. continued, "the entire process of evaluation as contemplated by the definition (of judging) is to service the decision making act" (1971, p. 32).

Regarding the second assumption, that the process of decision making includes a choice among alternatives, one has only to study the decision making models conceived by Churchman (1968), Griffiths (1959), Kaufman (1972), Provus (1971), Simon (1960), and Stufflebeam et al., (1971) to see that choice among alternatives is the essence of the process. (These models will be reviewed briefly in Chapter II.)

Regarding the third assumption, that in making a choice among alternatives, analytic techniques, including simulation models, can assist the decision maker, various models using analytic techniques have been produced to assist educational administrators in choosing the decision alternative which allocated resources in the best manner.

Emory and Niland listed and described seven analytic techniques, of which the most important to this discussion is simulation, which:

. . . consists of the use of a large sample of transactions related to a mathematical model of a process of phenomenon being investigated. The sample trials are performed by manipulations of the mathematical model rather than in an actual physical sense. (Emory & Niland, 1968, p. 275)

Emory and Niland (1968, p. 279) summarized the following application of these techniques:

1. It is possible to program decisions that have heretofore not been programmable.
2. It is possible to refine decision making.
3. It is possible to handle a complexity of variables greater than can be handled by the unaided human mind.
4. The decision maker can explore the implications of alternative courses of action in a hypothetical way at low risks and low cost.

Six models will be discussed briefly in Chapter II. The six are Resource Requirements Prediction Model 1.6 (RRPM), Comprehensive Analytical Methods of Planning in University/College Systems VIII (CAMPUS), System for Evaluating Alternative Resource

Commitments in Higher Education (SEARCH), Temple University Planning Model (TEMPLAN), Nickens Budget Simulator (NBS), and Planning Translator II (PLANTRAN).

It should be emphasized at this point that the true value of any analytic technique or model lies in its ability to array alternatives, any one of which may be chosen by the decision maker.

Regarding the fourth assumption, that the viability of analytic techniques, including simulation models, must be determined prior to implementation by practicing educational administrators, the Academy for Educational Development, citing a 1972 study by Jerome F. Wartgow entitled An Assessment of the Utilization of Computer Simulation Models in the Administration of Higher Education, listed the following four basic characteristics to be used for pre-implementation evaluation:

1. Performance. How effective is the system in providing needed answers? How appropriate is it to stated needs? How well does it reflect institutional policy?
2. Utility. How useful is the system? How often will it be used and how many people will participate in its application? Is it flexible enough to accept major changes in organizational structure?
3. Time. What is the time required for installation? How much time is required for collecting base data necessary to operate the system? What is the time required to retrieve information?
4. Cost. Is the value of the information worth the cost of implementation? Will it save money in terms of time and personnel? Is a model really needed at current costs?

(Academy for Educational Development, 1973, p. 27)

Additionally, the Academy for Educational Development suggests that any analytic technique, including simulation models, be:

1. believable - must be capable of validation.
2. relevant - must represent reality as conceived by the user.
3. flexible - must retain its usefulness over time.
4. adaptable - to new management techniques which fit the needs of the individuals at the institutions.
5. communicable - the user must be able to participate directly in the manipulation of the model.

(Academy for Educational Development, 1973, p. 10)

As has been demonstrated, decision theory is part of, and inseparable from, administrative theory. Decision theory does, in fact, allow for choice of alternatives. Quantifiable techniques, including simulation, have been advocated at this step. However, prior to implementation of any analytic technique or model, a comparative analysis of the technique or model should be conducted in relation to other resource allocation simulation models in use.

The Problem

Statement Of The Problem

The problem of this study was to construct a comparative analysis model which can be used to evaluate educational resource allocation simulation models.

Delimitations And Limitations

In deriving characteristics used in constructing the model, hereinafter referred to as the MODEL, a limitation was placed which included only those parameters developed from a review of the literature relating to general administrative theory, decision making, and simulation research studies for the period 1938 through 1975.

Field-testing the MODEL was accomplished using expert opinion of officers presently in charge of or recently exposed to resource allocation simulation models at institutions of higher education across the nation. Validation of the MODEL was accomplished by using a scaling method of evaluation. Five selected community college presidents rated the usefulness of the MODEL.

Justification Of The Study

A number of simulation models exist which may be used by educators to assist in the allocation of resources. Various scholars have made the point that few models have been tested in light of characteristics derived from the theoretical literature and research studies in the field of simulation. Even fewer models have been related to administrative theory by way of the decision making process and simulation theory. The linkage of these theoretical areas is vital to an understanding of uses and capabilities of modern management techniques such as resource allocation simulation.

This justification is amplified when considering the resource allocation dilemma now extant throughout higher education.

Educational decision makers must avail themselves to the most modern and advanced aids in projection and analysis of decision alternatives.

John D. Millet, Vice President and Director of the Management Division of the Academy for Educational Development, discussed the mounting pressures on higher education to allocate resources better. Millet stated:

If the 'new depression' in higher education finance is one of the realities of our day, as I believe it is, then the 'new management' established to cope with the new depression is equally with us. This new management calls for an extensive and intensive array of information not previously collected or analyzed on most college and university campuses.

In the response of many different colleges and universities to the exigencies of the new depression, two circumstances seem to have prevailed. One has been the necessity of carefully devising an internal structure and process for resource reallocation; that is, an in-depth analysis of the objectives, costs, and income attached to the various programs of a particular institution. Upon this basis, decisions have to be made about what goals and what technologies to adopt consistent with the available income of the institution. Secondly, resource reallocation has placed immense new demands upon data collection and data analysis. Resource reallocation is not possible without extensive information to guide decision making. (Academy for Educational Development, 1973, p. 3)

Millet further stated:

Higher education faces continuing cost pressures from a multitude of new demands. The consequence is a new emphasis upon resource reallocation; a possibility only if the required data about program costs, program outputs, and program income are readily available. The task of the new

management in higher education is to gather the needed information for intelligent, persuasive resource reallocation.

There is one final and obvious observation to make about resource reallocation. Information is not a substitute for action. It can assist the decision making process; it cannot and does not replace decision-makers. (Academy for Educational Development, 1973, p. 7)

The testing of the MODEL using expert opinion of persons who have experienced implementation or application of one or more of the six resource allocation simulation models cited may aid implementation. Pre-implementation analysis has been one of the neglected areas in model application in education.

At the time of this writing there existed great concern about resource allocation in an austere financial environment. There was a great need for a comparative analysis model which dealt exclusively with simulation models designed to allocate scarce resources among competing needs.

Definition Of Terms

Decision alternatives. Two or more different actions that might be taken in response to some situation requiring altered action (Stufflebeam et al., 1971, p. 353).

Decision making. A series of actions and interactions through which questions or issues are resolved or disposed.

Model.

A convenient way of representing the total experience which we possess, of then deducing from that experience whether we are in the presence of pattern and law and, if so, of showing

how such patterns and laws can be used to predict the future (Rivett, 1972, p. 1).

Process. A particular and continuing activity subsuming many methods and involving a number of steps or operations (Stufflebeam et al., 1971, p. 354).

Resource allocation. The process of assigning or allocating resources among the various components of an educational system (McAfee, 1972, p. 12).

Simulation. Banghart and Trull (1973) define simulation as:

A form of copying the behavior of a system (for instance, an educational plan) that proceeds in true time-sequence. It is a working model that contains a set of variables representing the principle features of the real-life system. It permits decisions that determine how these features might be modified in real time. (p. 294)

Procedures

The MODEL was developed, field-tested, validated and evaluated in five phases:

Phase I

Phase I was confined to a review of theoretical literature related to general administration, decision making, and research studies in the field of simulation published 1938 through 1975. Four characteristics were chosen for which evaluative criteria were sought. They are:

1. Performance
2. Utility
3. Time
4. Cost

Phase II

Development of the MODEL based upon questions focused upon criteria derived from the literature as reviewed in Phase I. Focus was placed upon testing for the presence of the four characteristics which form the foundation of the MODEL.

Phase III

Phase III was confined to the field-testing of the MODEL using expert opinions of officers presently in charge of or recently exposed to resource allocation simulation models in institutions of higher education across the nation. Data were gathered from not less than two experts for each of the six resource allocation simulation models noted previously with the exception of TEMPLAN where only one expert was used. A pre-interview telephone communication was held with each expert requesting his participation in the study and delineating the types of data which would be needed to answer questions posed by the investigator.

The evaluations received from the field-test group were used to refine the MODEL in an effort to make it more meaningful to the user.

Phase IV

Phase IV was confined to the validation of the now modified MODEL by using a scaling technique to rate each question of the MODEL. Selected college presidents served as the validators. These persons were identified as presidents who made use of modern management techniques in the daily management of

their institutions. Identification of these persons was accomplished by requesting the following people to identify an unspecified number of presidents meeting the qualifications listed above. These persons and the organizations which they represent were as follows:

Dr. Maxwell C. King
Past Chairman, Presidents Academy, AACJC
President, Brevard Community College

Mr. Kenneth G. Skaggs
American Association of Community Junior Colleges

Dr. Fred L. Wellman
President, National Council of
State Directors of Community Colleges

The presidents, who were named independently by two of the three persons noted above, were included in the group who were asked to validate the MODEL.

Phase V

Phase V was confined to the assessment of the results of field-testing and validation of the MODEL.

Organization Of The Research Study

The research study contains six chapters:

Chapter I consists of an overview of the study which includes the statement of the problem, justification of the study, and procedures followed.

Chapter II consists of a review of the theoretical literature related to general administration, decision making, and simulation research studies for the purpose of the derivation of evaluative characteristics for use in developing a resource allocation simulation comparative analysis model.

Chapter III consists of a presentation of MODEL field-test data.

Chapter IV consists of a presentation of MODEL validation data.

Chapter V consists of an analysis of MODEL field-test and validation results.

Chapter VI consists of a survey of the study and observations and conclusions reached by the investigator.

CHAPTER II

REVIEW OF LITERATURE AND FORMULATION OF THE MODEL

The theoretical literature relating to administration in general to decision making in particular, as well as research studies in the field of simulation was reviewed in order to derive the criteria which are necessary to formulate questions used in determining the presence of the four basic characteristics which form the foundation of the resource allocation simulation comparative analysis model.

The four characteristics are:

1. Performance
2. Utility
3. Time
4. Cost

Administrative Theory: Foundation For Decision Making

As noted in Chapter I, numerous individuals have written concerning the theoretical concepts and principles underlying educational administration. Often these theorists speak generally about the sciences, of which educational administration is a part.

Morphet, Johns, and Reller noted that "there is a discernable linkage among all sciences" (1957, p. 60). This linkage is known as systems theory. Many authors have contributed to

the development of this concept (Griffiths, 1959; Halpin, 1958; Hearn, 1958; Miller, 1965; Parsons and Shil, 1951). From these general theoretical concepts, models were formulated specifically for solving the problems of organization and administration (Morphet, Johns, and Reller, 1959, p. 65).

Corwin, Lane, and Monahan trace the development of educational theory beginning with Mort in 1916, and continuing through Halpin, Griffiths, Thompson, and Cornell (cited in Monahan, Theoretical Dimensions of Educational Administration, 1975, pp. 73-76).

Daniel Griffiths, in his book Administrative Theory, formulated the theoretical framework for the theory of educational administration as it is known today. Griffiths credits three organizations with having excited interest in the rebirth of the theoretical dimensions of administration. They were the National Conference of Professors of Educational Administration (NCPEA), the Kellogg Foundation, and the University Council for Educational Administration (UCEA) (Griffiths, 1959, p. 5).

As noted in the Introduction, numerous scholars, including Barnard, Drucker, Griffiths, Halpin, Hearn, Livingston, McCammy, and Simon, have written extensively about the decision making process and why it is inseparable from the whole of administrative theory.

McCammy, in 1947, stated that:

The decision making process is at the very center of the process of administration and the discussion of administration will be more systematic if we accept a framework for the analysis of decision making. (p. 41)

Livingston envisioned:

the concept of decision making to include . . . the process by which the decision is arrived at, . . . the process by which we implement or make the decision 'work,' . . . that (his decision making) is a continuing, dynamic process rather than an occasional event, and that decision-making becomes the basis for all managerial action. (1953, p. 659)

Decision Making: Transition

Simon was one of the first authors to contrast traditional and modern decision making techniques. Simon visualized executive decisions as vital to each approach. Executive decisions consist of two types--programmed and nonprogrammed. Simon defined each as follows:

Decisions are programmed to the extent that they are repetitive and routine to the extent that a definite procedure has been worked out for handling them so they won't have to be treated de novo each time they occur.

Decisions are nonprogrammed to the extent that they are novel, unstructured, and consequential. There is no cut-and-dried method for handling the problem because it hasn't arisen before, or because its precise nature and structure are elusive or complex, or because it is so important that it deserves a custom-tailored treatment (Simon, 1960, pp. 5-6).

The difference between the two lies in the technique or method used to make the decision. General organizational policy is used in making programmed decisions in the traditional sense. Operations research, modeling, and simulation are used in the modern approach.

Non-programmed decisions are typified by executive decision in the traditional mode. Computer simulation is used in this mode also.

Decision Making Models

A number of decision making models have been designed. Many of these are applicable to educational administration. A review of models created by Churchman (1968), Griffiths (1959), Kaufman (1972), Provus (1971), Simon (1960), and Stufflebeam et al., (1971) follows.

Griffiths' Model. As noted previously, Daniel Griffiths translated the concept of the scientific method into a theory of decision making.

A process of six distinct events was set forth by Griffiths:

1. Recognize, define, and limit the problem.
 2. Analyze and evaluate the problem.
 3. Establish criteria or standards by which the solution will be evaluated or judged as acceptable or adequate to the need.
 4. Collect data.
 5. Formulate and select the preferred solution or solutions. Test them in advance.
 6. Put into effect the preferred solution.
 - a. Program the solution.
 - b. Control the activities in the program.
 - c. Evaluate the results of the process.
- (1959, p. 92)

Griffiths noted that the most critical event in the model was the establishment of criteria for judgment (1959, p. 102). It is at that point the goals, values, and aspirations of the individual and the organization are incorporated into the decision making process.

Griffiths pointed out that the decision, implicit in event five above, consists of three separate parts:

1. the formation of several solutions or decisions,
2. weighing the consequences of each solution (assigning probabilities),
3. the selection of a single best solution as the most likely to succeed.
(1959, pp. 103-106)

Kaufman's Model. In 1961 Roger A. Kaufman designed a systems approach model to educational management. Kaufman viewed the system as a problem solving process consisting of six steps.

Problem identification encompassed steps one and two. Problem resolution encompassed steps three through six. Kaufman envisioned step six as encompassing the five preceding steps and identified this function as a continuing evaluation and revision process.

A final aspect of Kaufman's model provided a matching of modern planning, management, and evaluation techniques with the various phases of the model.

Provus' Model. In the late 1960's, Malcolm Provus developed the Discrepancy Evaluation Model (DEM). The model was the result of work conducted for the Pittsburgh school system involving evaluation requirements of the Elementary and Secondary Education Act. The model emphasized a continued analysis of discrepancies between standards and performance.

At about the same time that specifics of the Discrepancy Evaluation Model were published, Provus revealed a paradigm

for the decision making process generically known as the "action-analysis model." The specifics of this model were essentially the same as those of the DEM. The decision maker concentrates on the difference between "what is" (reality) and what "should be" (standard). The model allowed decision makers three major action alternatives: (1) change reality, (2) change the standard, (3) no change.

Churchman's Model. In 1968, C. West Churchman published The Systems Approach which introduced a planning model designed to revolve about the decision maker. Specifically, the model was concerned with the decision maker who chooses among alternative courses of action in order to reach first stage goals, which in turn lead to the accomplishment of ultimate objectives (Churchman, 1968, p. 150).

Stufflebeam et al. Model. Daniel Stufflebeam served as chairman of the National Study Committee on Evaluation established by the Research Advisory Committee and the Board of Directors of Phi Delta Kappa, a national educational leadership organization. The charge of the Committee was to produce an evaluative model which would satisfy requirements under the Elementary and Secondary Education Act of 1965. A major product of this effort was the Context Input Process Product (CIPP) Model (Stufflebeam et al., 1971, p. 235). The model was based on eight premises designed to support the decision making process.

Analytical Methods Of Decision Making

A transition beyond the modern techniques noted previously is the analytical methods of integrated decision making based

on systems theory.

Emory and Niland (1968, p. 275) noted the following quantitative techniques:

1. Mathematical Models
2. Probability Theory
3. Linear Programming
4. PERT/CPM
5. Simulation
6. Queuing Theory
7. Dynamic Programming.

Emory and Niland (1968, p. 279) summarized the following applications of quantitative techniques:

1. It is possible to program decisions that heretofore have not been programmable.
2. It is possible to refine decision making.
3. It is possible to handle a complexity of variables greater than can be handled by the unaided human mind.
4. The decision maker can explore the implications of alternative course of action in a hypothetical way at low risks and low cost.

Simulation In Education

The literature provided numerous examples of simulation models used in higher education. The Management Division of the Academy for Educational Development (AED) noted in its publication Let's End the Confusion About Simulation Models:

The ultimate goal of simulated planning models is to enable the colleges and

universities to make more rational decisions about the use of their own resources and the direction of their development. (1973, p. 9)

In order to provide information relating to the various simulation models currently available to institutions of higher education, the following section described six such models.

Namely,

1. Resource Requirements Prediction Model 1.6 (RRPM)
2. Comprehensive Analytical Methods of Planning in University/College Systems VIII (CAMPUS)
3. System for Evaluating Alternative Resource Commitments in Higher Education (SEARCH)
4. Temple University Planning Model (TEMPLAN)
5. Nickens Budget Simulator (NBS)
6. Planning Translator II (PLANTRAN).

RRPM. In its 1973 publication, Introduction To The Resource Requirements Prediction Model 1.6, NCHEMS lists several characteristics of RRPM 1.6 which appear to be useful in resource allocation. Also NCHEMS notes that iteration 1.6 is a more flexible tool for exploring alternative ways of utilizing institutional than prior model iterations. The program is written in ANS COBAL and can be run on a computer with 50K bytes of storage. One particularly attractive feature of RRPM 1.6 is its report writing feature. Specifically, four areas of institutional reports are generated as follows:

1. Line item budgets for institutional units
2. Program budgets

3. Institutional summary reports

4. Institutional parameter data

Essentially, RRPM 1.6 produces institutional program budgets based on historical or projected institutional data. It does this in a short time, using relatively little computer storage, and arrays the data in a format which is readable.

CAMPUS. The Comprehensive Analytical Methods of Planning in University Systems (CAMPUS) model is a college and university planning model developed by the Systems Research Group in Toronto, Canada. CAMPUS, like RRPM, has experienced several iterations since its initial inception in 1965. The Exxon Educational Foundation has contributed to several experiments with CAMPUS in colleges and universities in America.

CAMPUS is a data based planning model. Institutional data are input according to NCHEMS program classification format. Information about finance, programs, students, space, equipment, and staff is included as input.

For the purpose of this study, it should be noted that a simulation feature is included in the model. Multi-year, annual, or term reports can be generated for preceding time (historical data) or future time (projected data). The user has only to change the mathematical relationships which exist between various resource user segments of the institution to provide "what if" projections. This feature allows the administrator the luxury of viewing the impact of a decision in model format prior to actual implementation.

SEARCH. The System for Evaluating Alternative Resource Commitments in Higher Education (SEARCH) was developed by Peat, Marwick, Mitchell and Company. SEARCH is also referred to as Computer Assisted Planning for Small Colleges (CAP:SC). Designed to take advantage of the cause and effect relationships which exist in an open living system such as an institution of higher education, SEARCH manipulates given mathematical relationships to produce output which demonstrates the effect of various decision alternatives prior to implementation. Institutional input includes data on students, staff, faculty, finance, programs, and facilities. One or more of these values can be held constant. This enables the user to observe change of variable magnitude and its effect on the remaining variables.

It is important to note the flexibility of SEARCH. It allows the user to determine the depth of detail and intricacy demanded. The projection feature of the model can be tailored to the needs of the institution.

TEMPLAN. William A. Shoemaker noted in his 1973 publication entitled Systems Models and Programs for Higher Education. A Catalogue that the Temple University Planning Model (TEMPLAN) was developed at Temple University for use by university administrators in the budgeting and planning process. However, when the investigator spoke with Dr. Thomas Scott of Villanova University regarding the model, he claimed authorship of the model,

TEMPLAN is designed to forecast the influence of trends upon the entity under study. Specifically, data from four areas

are incorporated in the model;

1. Faculty
2. Income
3. Expenditure
4. Enrollment,

Model output can be produced in two distinct ways valuable to the administrator. First, TEMPLAN will produce an output based on the manipulation of a variable such as enrollment. Second, the model can work backward in the sense that results are specified by the user with the model furnishing the decision alternatives necessary to reach the prestated objective.

NBS. The Nickens Budget Simulator was developed by John M. Nickens of the Florida Community-Junior College Inter-Institutional Research Council (IRC). The NBS is a model designed to assist the educational administrator in anticipating the impact of alternative approaches to resource allocation upon the educational entity. The Nickens Budget Simulator (NBS) is a "computerized model designed to facilitate quick and convenient exploration of budgetary alternatives" (Nickens, 1975, p. 1). These explorations are accomplished by computing cost of alternatives for user designed levels within the educational entity. The NBS determines costs of programs, arraying these costs by sub-areas, and divisions. The user chooses what, specifically, will be designated as a program, sub-area, area, or division.

The NBS requires input from the most recent fiscal period as baseline data. These input are converted to ratios by the NBS.

These ratios are in turn applied to user specified levels of resource allocation.

NBS output is an array of alternative ways to reach a zero difference between revenue and program cost.

PLANTRAN. The Planning Translator II (PLANTRAN) was developed by the Midwest Research Institute for the Kansas City Regional Council of Higher Education. PLANTRAN is not a simulation model in the same sense as those discussed previously. Rather, it is a computer language which lends itself to the construction of a model around specific institutional needs. The determination of the interrelated mathematical relationships which exist between resource users and resource suppliers is vital. The eventual model is based on input from the institution not unlike the data required of the model discussed above.

The primary advantage seems to be the tailoring of the model to institutional needs. The vehicle to accomplish this is PLANTRAN. This leaves maximum user latitude in designing a forecasting or simulation model. The inherent danger with such a system is the user may not be aware of the appropriate detail necessary to insure adequate coverage of all influences affecting the institution.

Limitations Of Simulation Models

All simulation models possess limitations of some kind. These limitations may take the form of finite programs which the user cannot manipulate. They may manifest themselves as entry or exit criteria. That is, only a single computer language

or hardware configuration may be used to access or exit the model.

Probably the most obvious and widespread limitation influencing any resource allocation simulation model is the user's ability to manipulate the model to the user's best interest. This is particularly evident when preprogrammed, nonmodifiable models are used. The user is limited in this feature to the point that institutional planning for resource allocation may revolve around model output.

Additionally, the literature pointed out that the user expectation of model performance may influence actual model performance. Expecting a panacea for all institutional management information and planning problems, the new user may be somewhat dissatisfied with less than perfect model outcomes.

Also, it appears some decision makers envision models as tools which in fact make decisions. Nothing could be farther from reality. Most models do produce an array of decision alternatives, one of which may be chosen by the administrator.

The MODEL

The presentation of the resource allocation simulation comparative analysis model represents the final step of the series of events began in the Introduction. The linkage of administrative theory of the MODEL is essential to understanding concepts incorporated in the model.

As noted previously, the foundation of the MODEL consists of four characteristics set forth by the Academy for Educational

Development in its 1973 publication Let's End The Confusion About Simulation Models (p. 27). The four characteristics are;

1. Performance
2. Utility
3. Time
4. Cost

Each characteristic will be expanded using a question format. The questions following each characteristic embody criteria necessary to determine if, and to what extent, the particular characteristic is present in the resource allocation simulation model to which the comparative analysis model is applied.

Performance

The Academy for Educational Development suggested three ways by which to measure model performance prior to implementation. They were:

1. How effective is the system in providing needed answers?
2. How appropriate is it to stated needs?
3. How well does it reflect institutional policy? (1973, p. 27)

When an institution decides to implement a resource allocation simulation model, it should have determined in advance that wide institutional participation is mandatory for maximum results.

The following specific questions should be answered:

1. Will there be institution-wide participation in the modeling process?

2. Is the input/output of the model so detailed and intricate that it may alienate users unaccustomed to computer jargon and methods of operation?

3. Is the model accessible to those desiring to participate?

4. Is the model flexible enough to accommodate various levels of user sophistication?

5. Is the model flexible enough to accommodate changes in computer configuration, institutional organization structure, successive iterations of the model design, and advanced user sophistication?

6. Does the success or failure of the model depend upon the presence and continued concern of one or a few technically qualified persons?

Time

Again, the Academy for Educational Development suggested three measures pertaining to time as it relates to model pre-implementation investigation. They were:

1. What is the time required for installation?
2. How much time is required for collecting base data necessary to operate the system?
3. What is the time required to retrieve information? (1973, p. 27)

The characteristic time consists of three distinct dimensions: First, time of installation--that is, from the date the institution decides to implement the model, how many days will elapse before the first usable output is produced?

Second, after the model is functioning, what will be the length of time necessary for the model to process input and produce usable output? Third, in manhours, what percentage of computer services personnel will be dedicated to model operation? That is, will an inordinate amount of time be required to manage the model? The three areas are treated in the following paragraphs.

Installation time

1. From the date the contract is signed for purchase or rental of the model, how many days will elapse before the first usable model output is produced?

2. To what extent will institutional management be disrupted if the model installation is not completed on time?

Model processing time

1. Is model processing time acceptable in relation to management data needs?

2. Will the model require the complete dedication of computer equipment in order to accomplish its task in a timely manner?

Manpower commitment

1. In terms of available manhours, how much time must be dedicated to the model? This should include maintenance as well as actual time the model is operating.

2. Will additional personnel be needed in order to operate the model?

Cost

The Academy for Educational Development suggested three questions to be asked relating to cost prior to implementation of a resource allocation simulation model. They were:

1. Is the value of the information worth the cost of implementation?
2. Will it (the model) save money in terms of time and personnel?
3. Is a model really needed at current costs? (1973, p. 27)

Though reasonably comprehensive, the writer envisions the characteristic of Cost as more detailed than that presented by AED. Specifically, the characteristic of Cost should be divided into two areas:

1. preimplementation costs,
2. system maintenance costs.

These two areas are treated separately.

Preimplementation costs. Preimplementation costs are the most difficult to predict. An evaluation by management of the organization's position in relation to the current state-of-the-art in computer use is necessary. When this position is determined, management can move forward in the planning phase of preimplementation. The purpose of the assessment is to identify areas within the organization which are above or below desired levels of expertise.

Specifically, the following questions should be asked during the analysis of preimplementation costs:

1. What is the present commitment of the institution to data processing in terms of personnel, rental of equipment, capital invested in equipment, and facilities dedicated to data processing?

2. What is the level of expertise needed by data processing personnel to implement and maintain a resource allocation simulation model? Is this level of expertise available from within the institution? If not, how much will it cost to bring a new person into the organization or bring presently employed personnel up to this level of expertise?

3. What percentage of the current operating budget is presently designated for data processing? (Include all costs associated with the function such as personnel, maintenance, rental, depreciation, and consumables.) Will this percentage change with implementation? How much and in what areas?

4. Is the institutional data model processable? That is, are institutional facts and figures readily transferable into model understood input? Will model implementation necessitate an analysis of data flow within the institution? Is historical data, which is necessary to validate model outcomes, in processable form?

5. Will it be necessary to acquire resources from outside the institution to install the model? If so, what are the costs involved? Is this type service included in the cost of the model?

System maintenance costs. Once the resource allocation simulation model has been implemented, costs become somewhat predictable. Costs specifically allocable to the simulation model will be determined by its use after certain standard or fixed costs are recognized. Specific questions which should be asked about system maintenance costs are as follows:

1. Will the use of the model increase significantly the consumption of consumable computer service supplies such as paper, cards, and tape?

2. Is the cost of maintenance included as part of the resource allocation simulation model cost. If not, is a service contract available?

3. Will special forms be necessary for input and output of data to and from the model?

4. Is the model flexible enough to accept new versions of the model and changes of computer hardware? If so, how much will these future changes cost?

Summary

Chapter II has consisted of a review of theoretical literature relating to administration in general and to decision making in particular, as well as to research studies in the field of simulation. From this review specific criteria were derived and incorporated into questions to be used to assess the presence of the four basic MODEL characteristics when evaluating resource allocation simulation models. The chapter concluded

with presentation of the MODEL which consists of twenty-five questions designed specifically to measure the four characteristics chosen as the foundation of the MODEL:

1. Performance
2. Utility
3. Time
4. Cost

The questions asked in relation to each of the characteristics noted above were kept to a minimum intentionally. However, the data needed to answer the questions will require a great deal of research and thought by the administrators concerned. It is this research within the institution that produces the self-evaluation necessary for comparative analysis of various resource allocation simulation models.

The specific question format in which the MODEL was posed is presented as Appendix A. The questions are grouped under the characteristic which they seek to expose.

CHAPTER III

PRESENTATION OF MODEL FIELD-TEST DATA

Chapter II concluded with the formulation of the resource allocation simulation comparative analysis model. These questions, when asked of an organization prior to the implementation therein of a resource allocation model such as those reviewed in Chapter II, should provide the institution with a definite indication of the probability of beneficial results from the model. Specifically, the comparative analysis model presented should provide information necessary to evaluate the model relative to cost, personnel requirements, performance of the model, flexibility of the model, and value of model output in relation to institutional objectives; and, therefore, should aid an institution in making an informed selection among the various models available.

Procedure For Selecting Field-Test Evaluators

Field-testing of the MODEL was accomplished by using the expert opinion of field-test evaluators. In selecting persons to act as field-test evaluators, individuals most qualified to render expert opinion in the evaluation of the MODEL were sought. This researcher contacted each organization which created one of the six resource allocation simulation models reviewed in Chapter II. These organizations hereafter will be referred to as "parent

organizations." Specifically, the following persons at parent organizations were contacted:

1. Resource Requirement Prediction Model 1.6 (RRPM).
Dr. Al Service of the National Center for Higher Education Management System (NCHEMS).
2. Comprehensive Analytical Methods of Planning in University/College Systems VIII (CAMPUS).
Dr. Robert Barnett of the Systems Research Group.
3. System for Evaluating Alternative Resource Commitments in Higher Education (SEARCH).
Mr. Vincent Locascio of Peat, Marwick, Mitchell and Co.
4. Temple University Planning Model (TEMPLAN).
Dr. Thomas Scott of Villanova University.
5. Nickens Budget Simulator (NBS).
Dr. John M. Nickens of the Florida Community-Junior College Inter-Institutional Research Council (IRC), University of Florida.
6. Planning Translator II (PLANTRAN).
Dr. Robert Salmon of Midwest Research Institute.

These persons provided (a) names of institutions which had successfully implemented one of the particular models under study in this research and (b) the names of persons primarily responsible for the model implementation, several of whom were still employed by an adopting institution. In some cases the original advocate had left the adopting institution. In either case, the officer currently in charge of the resource allocation

simulation model, by virtue of his position, was assumed to possess the necessary expertise for properly evaluating the comparative analysis model within the context of this research.

List Of Field-Test Evaluators

Field-test evaluators were selected by the researcher from persons among those recommended by the parent organizations and by the adopting institutions. Each evaluator is identified in the list below by model expertise and position as of June, 1976. Twelve persons, (not less than two persons for each model with the exception of TEMPLAN where one expert was used), were asked to evaluate the MODEL.

Resource Requirements Prediction Model 1.6 (RRPM)

Ms. Margaret A. Denty
Office of Educational Planning and Research
St. Petersburg Junior College

Mr. William Hunsberger
Assistant to the President
Philadelphia Community College

Comprehensive Analytical Methods of Planning in University/College Systems VIII (CAMPUS)

Dr. Gary M. Andrew
Vice Chancellor, Administration & Planning
University of Colorado

Mr. Mike Mullen
Data Coordinator
Virginia Council of Higher Education

Systems for Evaluating Alternative Resource Commitments in Higher Education (SEARCH)

Mr. Sigmund Ginsburg
Vice President
Adelphi University

Mr. Richard W. Green
Vice President and Treasurer
Wesleyan University

Dr. Robert Hopmann
Wheatridge Foundation

Temple University Planning Model (TEMPLAN)

Dr. Thomas Scott
Villanova University

Nickens Budget Simulator (NBS)

Mr. Norris Minor
Director, Institutional Research
Seminole Junior College

Dr. Jeffery Stuckman
Director, Institutional Research
Florida Junior College

Planning Translator II (PLANTRAN)

Mr. Arthur Ashton
Fiscal Officer
West Virginia State College

Mr. William Pickett
Director of Development
Regis College

Initiating Field-Test Evaluation

Each field-test evaluator was mailed a field-test instrument (Appendix A) on June 25, 1976. Each evaluator was asked to review the MODEL and answer the following questions for each of the four areas forming the MODEL.

- A. Are the questions appropriate?
- B. Would you have asked other questions of a similar nature?
- C. Are the questions too general?
- D. Are the questions too specific?

- E. Do you see spin-off questions as a result of the questions asked? If so, what are they?

Evaluators also were asked to express their opinion as to the overall value of the MODEL. Additionally each evaluator was asked to submit general comments as appropriate.

Responses Generated By Field-Test

All replies were received before September 1, 1976. The presentation of the response data follows a format similar to that used in the MODEL presentation. That is, data related to MODEL characteristic one, Performance, will be followed by data related to Utility, Time, and Cost, in that order. Similarity of data among and between respondents will be noted in the analysis to follow. The overall evaluation of the MODEL by the respondents will be set forth additionally in order to discern overall strengths or weaknesses.

MODEL Characteristic One: Performance

Evaluator response to questions related to MODEL characteristic one, Performance, appeared to represent positions advocating more detail. Two persons noted that the term "decision alternative," used in each of the four questions related to Performance, needed to be defined so as to give the person using the MODEL a better understanding of the term and its implications.

One respondent noted the question set was "too ambiguous." This comment seems to indicate a need for greater detail and specificity. Again, indicating a need to inform better or to lead the user of the MODEL.

One respondent alluded to the presumption that users are assumed to be more sophisticated in their knowledge of resource allocation simulation models than may be the case. A second comment noted question two, which relates to user understanding of model output, was of great concern and deserved "extra weight" in the process of model evaluation. This seems to indicate an awareness by the respondent that different levels of user understanding exists. Also, the answer given to question two by the user will relate directly to user expertise and sophistication in this area.

An interesting paradox to the above comments, which essentially call for greater detail, is that no respondents evaluated the questions as either too general or too specific (question C and D respectively).

The question set related to Performance did generate spin-off questions in the minds of three respondents. Two of the questions related to a more indepth treatment of specific management areas. The third dealt with an detailed examination of one particular resource allocation simulation model.

The general implication to be drawn from the comments cited above appears to be a need for more detail in the form of definition of terms, more questions of a similar nature touching on a wider variety of subject areas, and the idea that the user may need to be guided throughout the use of the MODEL.

MODEL Characteristic Two: Utility

The question set related to Utility consisted of six

questions. Five of the six questions dealt with user oriented data. One of the six dealt exclusively with the configuration of the resource allocation model under study.

Six of the respondents chose to respond to the appropriateness of the questions asked. Three respondents noted that the term "institution-wide participation" should be defined more exactly. A similar observation was made regarding the word "flexibility" (questions 4 and 5).

The structure of the question set elicited comment from four of the respondents. It was suggested that question one be divided into two areas: one dealing with the structure of the model, and the second with the actual working of the model. One respondent suggested questions one, three, and four be combined. Two persons noted that question five was somewhat redundant when considering question two of the System Maintenance Costs question set.

One respondent noted that question two assumes a knowledge on the part of the user which may not be present. Also, question five requires an indepth knowledge of the resource allocation simulation model under study, a requirement which may prove unreasonable.

The question set related to Utility invoked a number of questions from the respondents of a nature similar to those of the question set. Essentially, these were a delineation of the parent questions. The majority of the questions require an indepth knowledge of the resource allocation model under study.

Detailed study of model output and input was suggested. The whole area of institutional competence to deal with such a model was questioned.

One respondent envisioned this question set as expanding to include a delineation of the advantages of using such a model. This would require an indepth analysis of the institution in which the model will be used.

It was noted by one respondent that the term "users" should be related more closely to kinds or levels of users. Also it was suggested that question one be narrowed somewhat.

No respondents felt the questions making up the question set were too specific.

Three respondents envisioned spin-off questions as a result of those making up the question set. Essentially, these were of two types. One related to personnel turnover and costs related to turnover. The second related to the concept of utility changing over time in relation to institutional priorities.

One respondent felt the entire question set was too technically oriented as opposed to focusing upon the product produced by the model. This person therefore implied a total restructuring of the question set was needed.

In general the respondent responses related to Utility were not unlike those recorded in relation to Performance. That is, more detail in the question set was suggested.

MODEL Characteristic Three: Time

The six questions comprising the question set related to Time were subdivided into three areas: Installation Time, Model Processing Time, and Manpower Commitment.

Three respondents chose to comment on the appropriateness of the question set. Two of these noted that question one of the Installation Time area was in need of more detail. Specifically, a delineation of factors related to the meeting of a single date of installation was suggested. Also it was noted that "anticipated" should precede "days" leading the investigator to believe there are numerous unknowns which usually contribute to a delayed date of final installation.

One respondent noted that the concept of cost should be approached in two ways: one, from the point of first or start-up costs; and the second, from the point of continuing costs (costs relating to time in this instance). This concept could be applied to the entire resource allocation simulation model.

One respondent was unsure of the relevancy of question two of the Installation Time section. Another respondent, commenting on the same question, was unsure of the factors which relate management of the institution to time of installation. This uneasiness implies a need for greater detail in the question.

Only one respondent recorded a response when asked if the question set induced the respondent to ask similar questions. This reply suggested that the idea of time be divided into four distinct areas. These areas were:

1. preparation
2. processing
3. analysis
4. revision.

Two respondents felt the questions were too general.

Essentially these persons suggested a further detailing of the questions to include manhours by level of employment within the educational entity such as technical, clerical, and administrative.

Two respondents felt the questions related to Time were too specific. One person suggested the use of timeframes rather than specifying a given number of days for installation. Additionally it was noted that the specificity of the questions was dependent upon the planned use of the resource allocation simulation model at the particular educational institution.

One respondent envisioned two spin-off questions as a result of those asked regarding Time. One dealt with investigating the possibility of model processing outside the educational entity. The second suggested an investigation into the possible expenditure of resources in compiling data not presently available in model processible form.

In general, the comments recorded by the respondents in relation to the question set entitled Time were more detailed than those related to Performance and Utility. In some instances, the investigator detected a parochial approach or attempt to align the resource allocation simulation comparative

analysis model with the model to which the particular respondent had been exposed. Additionally, the depth of knowledge required by the user to answer detailed questions may be present in the technical area only.

MODEL Characteristic Four: Cost

The MODEL characteristic Cost is divided into two areas: Preliminary Costs and System Maintenance Costs. Of the four MODEL areas, Cost received the most respondent attention. In order to simplify the presentation, responses to each question are treated separately. That is, all responses to question one, Preliminary Costs, across the evaluation question set (A through E) will be grouped together. The investigator saw this as a more concise way to report to the reader the thoughts, comments, and suggestions of the respondents.

Two respondents commented as to the appropriateness of question one, Preliminary Costs. One respondent saw this question as assuming that the model would be run aboard the educational entity, an assumption this person felt unwarranted. The second respondent saw this as an important question, but cautioned that first (start up) and continuing Costs should be differentiated.

One respondent suggested a question of a similar nature having read question one, Preliminary Costs. Essentially it dealt with determining the educational institution's commitment to data processing by measuring the utilization of data processing within the institution.

Two respondents felt question one, Preliminary Costs, was too general. One person cautioned that administrators using the resource allocation simulation comparative analysis model must be cautioned to answer this question thoroughly. The second respondent felt the question should provide the user some means of measuring the amount and extent of support within the institution.

Four respondents submitted comments as to the appropriateness of question two, Preliminary Costs. One respondent noted that "expertise" should be defined in such a way as to insure measurability of the term. A second respondent suggested a rephrasing of the question to simplify it and add a question related directly to knowledge of the resource allocation simulation model under evaluation. A third person suggested directing this question to the office within the institution tasked with coordinating the modeling effort. A fourth person suggested that the evaluation of "expertise" should not be confined to data processing personnel but should enter into all parts of the educational entity.

Two respondents recorded comments about question two, Preliminary Costs, as being too general. Essentially these responses dealt with the defining of terms, such as "expertise," in measurable terms. This process was referred to as "operationalizing" the terms.

One respondent suggested a spin-off question after having read question two, Preliminary Cost. This person felt that

expertise related to data processing should be assessed outside the area dealing directly with the model.

Two persons responded as to the appropriateness of question three, Preliminary Costs. The first suggested that in addition to the pricing of data processing equipment and operations that a direct question be asked related to the cost of the resource allocation simulation model under analysis. The second respondent stressed that post-implementation costs should be minimal when compared to those costs related directly to implementation.

One person responded when asked if question three, Preliminary Costs, was too general. Essentially the respondent suggested that question three be combined with question one of the same area.

Four respondents recorded comments related to the appropriateness of question four, Preliminary Costs. The clarification of terms such as "model-processable" was suggested. Also the deletion of the question related to historical costs was suggested. This particular suggestion appeared to be more a matter of philosophy of modeling than a suggestion backed by empirical data. Conversely, one respondent suggested a further delineation of terms and a general expansion of the question in order to obtain adequate responses from users.

One respondent felt question four, Preliminary Costs, should be broken down into a number of areas and rephrased in an effort to solicit the type response needed. This rephrasing was suggested

as a possible means of advising the user that validation of the model using historical data was necessary and then forcing the user to evaluate the institution's ability to do this.

Two respondents perceived question four, Preliminary Costs, as too general. The respondents called for clarification of terms in measurable quantities.

Two respondents envisioned spin-off questions as a result of reading question four, Preliminary Costs. One respondent foresaw the institution utilizing the MODEL investing too much time in the evaluation of this area, thereby implying a simplification of the entire question was necessary. The second respondent, singling out a portion of question four to comment on, noted that costs would probably rise if the user institution was not organized in such a way as to facilitate data input into the model.

One respondent commented as to the appropriateness of question five, Preliminary Costs. The respondent noted that the question simply forced the user institution to go through the budget preparation process in relation to the proposed modeling venture.

One respondent noted that question five, Preliminary Costs, was too general. Specifically, the person suggested that various terms within the question be stated in measurable quantities.

The analysis now shifts to the System Maintenance Costs portion.

Four persons recorded comments as to the appropriateness of question one, System Maintenance Costs. One respondent saw

this question as a logical subset of question one, Preliminary Costs, and suggested combining them. A second viewed the question as relating to other cost areas and suggested its inclusion elsewhere. Another person viewed the question as trite and not worthy of asking. A fourth respondent suggested the simplification of the question in an effort to derive data from the user more easily.

One respondent envisioned a number of spin-off questions related to question one, System Maintenance Costs. Essentially, the respondent cautioned that continuing costs, unrelated to supplies, should be investigated by user institutions.

Three persons responded as to the appropriateness of question three, System Maintenance Costs. One respondent suggested that question one and three of this section be combined in an effort to simplify the MODEL. A second respondent considered the question irrelevant and unworthy of inclusion in the MODEL. A third respondent foresaw an expansion of the question to include queries related to the availability of forms, either by way of the model under consideration or through local sources.

One respondent commented as to the appropriateness of question four, System Maintenance Costs. Essentially the comment dealt with the inability of the user to define adequately the cost factors relating to future changes in the resource allocation simulation model.

One respondent envisioned questions of a related nature after reading question four, System Maintenance Costs. Essentially the questions revolved around the ability of the model being evaluated to accept new or additional changes without undue manual manipulation of the model programming.

Two of the respondents chose to make general statements as to the appropriateness of all questions included in the Cost area. One respondent cautioned that a wide variety of responses to the questions should be expected due to the varied levels of technical background as well as varied levels of analysis. The second respondent suggested an expansion of the scope of the question set to include all levels of personnel involved in the modeling process.

Six persons envisioned questions of a related nature. Essentially these questions emphasized the need for greater detail and definition of terms.

Two persons felt the System Maintenance Costs questions were, in general, too specific.

One respondent suggested a shift in emphasis away from the materials portion of costs in order to concentrate on technical maintenance. The second respondent saw the questions as being too narrow and suggested a shift toward a more structured approach in the cost area. The data collection system of the model was emphasized.

Five persons envisioned spin-off questions as a result of those asked in the Cost section.

Essentially, these questions varied widely in subject as well as depth of study. In general it can be stated that most desired an increase in detailed questions relating to costs. Also questions were advocated of a very technical nature often identifiable with one of the six resource allocation simulation models experienced by the respondents.

The comments offered by the respondents in relation to the Cost question set were extremely varied and intricate. Again, the overwhelming indication was expressed for the inclusion of more explanation of terms as well as a broadening of the questions.

Overall Evaluation Responses

Five of the twelve respondents offered overall evaluations of the entire resource allocation simulation comparative analysis model. These evaluations were comprehensive in nature and generally reaffirmed the position the respondent had taken when evaluating the individual question sets of the MODEL. It was noted that the advocacy role of a single administrator or data processing technician may not be enough to convince the entire institution that modeling is necessary. Additionally, it was noted that varied replies may be received from users.

A group of comments related to the implied assumption by the investigator that a level of expertise or model experience existed within the user institution which may not be present. This criticism proves noncritical if adequate technical expertise is available at some level within the institution.

Modification Of MODEL

The purpose of field-testing the MODEL was to gather expert opinions of persons previously or currently associated with a resource allocation simulation model in order to modify the MODEL for use by persons unfamiliar with such modeling. Modification of the original MODEL (Appendix A) was accomplished by incorporating changes suggested by the field-test group. The modified MODEL appears as Appendix B.

In general, the MODEL was shortened from twenty-five questions to twenty-two questions. Certain terms such as "decision alternative" and "expertise" were defined more clearly. The original areas of the MODEL were maintained but arranged differently. Specifically, "PERFORMANCE" and "COST" were interchanged in the MODEL format. Also, the questions were numbered consecutively rather than questions related to each of the four basic areas being numbered separately. Three of the original MODEL questions remained unchanged. The remaining questions represent either modifications of original questions or completely new questions. No change was made which did not lend itself to simplification or clarification of the MODEL. The five question evaluation set (questions A through E) was replaced by a single page answer sheet.

Additionally, the questionnaire was modified in format to ask two distinct questions of the MODEL validators: one, how useful are the questions in relationship to needs of your institution and two, how useful do you feel these questions would be

to the community college system as a whole. This distinction was made in an effort to determine if the validators perceive their institutions as different from the whole of community colleges.

Summary

As a result of the field-test data, the MODEL was modified. Specifically, the number of questions was cut from twenty-five to twenty-two; various terms found confusing to the field-test group were defined more clearly; an attempt was made to quantify and qualify terms and values more precisely; and the format was changed by incorporating an area on the questionnaire which asked the respondent to rate each question while viewing it from a wholistic point of view. This latter request was included in an effort to determine if a difference in perspective existed in the minds of the validators when viewing their institution as opposed to the community college system as a whole. In practice, an institution using the MODEL would not concern itself with this differentiation.

The MODEL, modified as described by incorporating improvements suggested by the field-test data, was then submitted to a process of validation which produced the results presented in the following chapter.

CHAPTER IV

PRESENTATION OF MODEL VALIDATION DATA

Chapter IV discusses the MODEL validation process and presents a synopsis of validation responses generated by persons participating in this research by serving as MODEL validators.

Selection of MODEL Validators

In order to determine the names of community college presidents across the nation who were attuned to modern management theory and techniques in the daily management of their institutions, the investigator contacted, by telephone, three persons who held positions of prominence within national organizations who interface constantly with such presidents. The persons contacted were:

Dr. Maxwell C. King
Past Chairman, Academy of Presidents (AACJC)
President, Brevard Community College

Mr. Kenneth G. Skaggs, Consultant
American Association of Community-Junior Colleges

Dr. Fred L. Wellman
Chairman, National Council of State Directors
of Community Colleges
Executive Secretary, Illinois Community College Board

Each of these persons was asked to name as many presidents as they chose who met the criteria outlined above. The modified MODEL was sent to each president who was named by not less than two of the persons cited above. This list consisted of the following presidents:

Dr. Richard H. Hagemeyer, President
Central Piedmont Community College

Dr. Robert E. Lahti, President
William Rainey Harper College

Dr. Leland B. Luchsinger, President
Denver Community College

Dr. Peter Masiko, Jr., President
Miami-Dade Community College

Dr. Bill J. Priest, Chancellor
Dallas County Community College District

Dr. William C. Strasser, President
Montgomery College
Central Office

Validation Technique

As to validation technique, validators were asked to score each question on a scale of one to five as to its usefulness first, to his institution, and second, to the community college system as a whole. Responses ranged from "no use" (point value of one) to "one of the most useful" (point value of five). A two point value was assigned to "slight use," a three point value to "moderate use," and a four point value to "very useful." By averaging the validator-assigned values awarded to each question, an indication as to the question's validity, from the perspective of the validator group, was determined.

MODEL Validation Data Summary

The presentation of the analysis of MODEL validation follows a format similar to that used in the MODEL presentation to the validators. Each of the 22 questions will be reported separately.

Moreover, the validators' opinions as to the usefulness of each MODEL question to their institution as opposed to all other institutions of higher education will be reported.

Of the six community college presidents asked to validate the MODEL, five responded by January 31, 1977. The results of these five validations form the basis of the following analysis. The questionnaire, as it was sent to the above named validators, is presented as Appendix B.

MODEL Characteristic One: Performance Validation

The first three questions of the questionnaire dealt with PERFORMANCE. Of the three questions, number one received the highest average rating across the two question areas. Specifically, average values on a five point scale were assigned as follows:

Table No. 1: Average of Responses Related to Performance

Question	Average Value Assigned	
	My Institution	All Institutions
1	4.20	3.60
2	3.60	3.20
3	3.40	3.00
mean	3.73	3.26

MODEL Characteristic Two: Utility Validation

Questions four through nine dealt with UTILITY. Of the "My Institution" and "All Institutions" responses, question seven received the highest rating. Average ratings across questions were as follows:

Table No. 2: Average of Responses Related to Utility

Question	Average Value Assigned	
	My Institution	All Institutions
4	3.80	3.60
5	3.60	3.80
6	3.40	3.80
7	4.20	4.00
8	3.60	3.60
9	3.80	3.60
mean	3.73	3.73

MODEL Characteristic Three: Time Validation

Questions ten through fifteen were dedicated to the subject of TIME. Question twelve of the "My Institution" received the highest rating. Question fourteen received the highest rating in the "All Institutions" category. Average ratings across questions were as follows:

Table No. 3: Average of Responses Related to Time

Question	Average Value Assigned	
	My Institution	All Institutions
10	3.20	3.20
11	3.40	3.40
12	4.40	4.00
13	4.00	4.00
14	4.20	4.40
15	3.60	3.60
mean	3.80	3.76

MODEL Characteristic Four: Costs Validation

Questions sixteen through twenty-two were devoted to exploring the area of COSTS. Question eighteen received the highest rating for the "My Institution" group. Question sixteen received the highest rating for the "All Institutions" group. Average ratings across questions were as shown in Table No. 4.

Table No. 4: Average of Responses Related to Costs

Question	Average Value Assigned	
	My Institution	All Institutions
16	3.40	4.00
17	3.20	3.80
18	3.60	3.80
19	3.40	3.40
20	3.40	3.80
21	3.00	3.20
22	3.40	3.60
mean	3.34	3.65

The four question set averages were as follows:

Table No. 5: Question Set Averages

Question	Average Value Assigned	
	My Institution	All Institutions
Performance	3.73	3.26
Utility	3.73	3.73
Time	3.80	3.76
Costs	3.34	3.65

Of the five respondents who validated the MODEL, only one submitted comments in addition to the direct responses recorded on the answer sheet. Specifically, this respondent questioned the timing factor of being able to answer the MODEL questions in relationship to the maturity or sophistication of the institution using the MODEL. For instance, he noted the ability of an institution to determine intelligently decision alternatives offered by a particular simulation model seemed premature. Additionally, this respondent saw no need to array the question format in a fashion which forces the evaluator to differentiate between his institution and institutions as a whole. He noted that questions relating to "Performance" (questions one through three) could be answered in theoretical terms only. Lastly, this person noted that question fifteen was redundant to fourteen and that a yes answer to question sixteen begs the question.

Summary

The purpose of Chapter IV was to present in summary form the results of the MODEL validation process. The presentation of results followed the format of the instrument sent to the validators (Appendix B).

CHAPTER V

ANALYSIS OF FIELD-TEST AND VALIDATION RESULTS

Chapter V presents an analysis of the MODEL field-test and validation returns. It should be noted that the processes reviewed in Chapters III and IV were designed to refine and modify the MODEL so that it might be more usable by colleges looking for a resource allocation simulation model. Specifically, the original MODEL (Appendix A), which was derived from the literature relating to the subject, was sent to a group of persons familiar with the implementation of one or more resource allocation simulation models. This group of twelve technically oriented persons reviewed the MODEL and commented on its appropriateness and suggested possible changes which could be made to enhance the usefulness and the clarity of the MODEL. After incorporation of the changes, the revised MODEL (Appendix B) was forwarded to a group of community college chief administrators for validation. The validation took the form of rating each MODEL question as to its usefulness to the validator's own college as well as to the community college system as a whole. The results of this iteration of questioning were presented in Chapter IV.

Field-test Data Analysis

The original MODEL (Appendix A) was sent to a group of evaluators selected via the process noted in Chapter II. This

group of evaluators was highly qualified technically in the computer simulation area of their choice. This point is emphasized. Even though the six simulation models with which the evaluator group was familiar were not dissimilar, each evaluator appeared to evaluate the MODEL in terms of the model of which he was most knowledgeable. This feeling produced an overall evaluator call for more detail and greater clarification of terms. In modifying the MODEL, this concern was given close attention. The apparent effect of this change was that none of the validators repeated this demand for more detail.

Another pervasive comment among the field-test evaluators was an apparent assumption on the part of the investigator that users of the MODEL were more advanced in their knowledge of computer simulation than was probably true. In fact, some evaluators felt the users may not be sophisticated enough to answer meaningfully the questions posed by the MODEL. Although the investigator recognized this was a possibility, he felt the extensive use of electronic data processing equipment across all American industry, including higher education, rendered this consideration moot.

Several of the field-test respondents recommended the addition, deletion, or expansion of MODEL questions or question sets (Performance, Utility, Time, Cost). In some instances, this suggestion appeared practical and was incorporated into the revised MODEL. In other areas, to change the essence of the question or its format seemed unnecessary. Of the twenty-five

questions making up the original MODEL, only three remained to be incorporated in the revised MODEL. Others were either modified or deleted.

It should be noted that in the review of responses in Chapter III, many field-test evaluators suggested more detail be incorporated. The investigator was very hesitant to include more detail as it was felt that the addition of detail would have a deleterious effect in two ways. First, the incorporation of more detail could possibly narrow the scope of the instrument and thereby limit its application. Second, the inclusion of greater detail may have had the influence of alienating the proposed user, the chief executive of the college. It was reasoned by the investigator that these persons would not be receptive to the more intricate nuances of a highly detailed and structural evaluation instrument. Additionally, the detailing of questions or terms may have had the effect of removing an institution's ability to adjust the instrument to local needs. To detail and define is to narrow and specialize beyond that desired for a general purpose instrument. The investigator was diligent in attempting to maintain flexibility in the MODEL while, at the same time, forcing the user into a structural approach to evaluation.

Analysis of Validation Responses

The selection process by which six community college presidents were chosen as MODEL validators was delineated in Chapter IV. Five of six validators returned the questionnaire.

The sixth respondent was in the process of leaving his institution and chose not to reply to the questionnaire.

The MODEL as it was presented to the validators appears as Appendix B. Readers should note the answer sheet upon which the validators recorded their responses served a dual function. First, it allowed the validator to score each question of the MODEL in relation to its usefulness at his institution. Second, the answer sheet elicited the validator's response as to his feeling of how useful the MODEL would be to all community colleges. This answer format was used in an effort to detect if validators perceive their institutions as a part of or separate from the whole of community colleges relating to their use of simulation models. This attitude was to be detected by a marked difference in scoring the "My Institution" and "All Institutions" sections of the answer sheet.

Responses to the first question set, PERFORMANCE, produced the greatest average point divergence between "My Institution" and "All Institutions." The validators scored the questions in such a way as to indicate the questions would be more useful at their institutions as compared to others.

Responses to the second question set, UTILITY, indicated a matching of usefulness between the validators' institutions and institutions as a whole. Question seven of the "My Institution" set received the highest average score with question six receiving the lowest. Question seven received the highest score in the "All Institutions" area.

Responses to the third question set, TIME, produced the highest average scores in both areas. There was little difference in average rating between the "My Institution" area and the "All Institutions" area. Question twelve received the highest average in the "My Institution" group. Question fourteen received the highest score in the "All Institutions" area.

Responses to the fourth question set, COSTS, produced the only situation where validators felt the question set to be more useful to "All Institutions."

As a whole, the MODEL appears to be acceptable to the group of validators. The acceptance rate was somewhat over seven on a ten point scale. This average indicates the MODEL is not acceptable to all. It was indeed designed as a general tool and is, therefore, by nature flexible and openended. It was perhaps this design prerogative which limited the MODEL's ability to be totally acceptable to all.

There appeared to be little difference in the way the validators perceived the usefulness of the MODEL when comparing their institutions and institutions as a whole.

Model Feasibility

The preponderance of data gathered by the investigator through field-test and validation processes indicated the MODEL was feasible to use for the purpose for which it was designed. This statement must be qualified somewhat. Individual need may dictate the necessity to modify the MODEL locally to suit better the entity's goals and objections. Additionally, it is foreseen

that perhaps only portions of the MODEL will be used. Locally produced derivatives of the MODEL may prove more effective. In its role as a guide or plan, the MODEL may produce the results for which it was designed.

Summary

Chapter IV was devoted to the analysis of field-test and validation data. General and specific responses to each iteration of questioning were noted. The data gathered in relation to validation were tabulated and sums presented as an indication of evaluator acceptance or rejection of particular MODEL questions.

Last, the feasibility of the MODEL was established. It was noted that total acceptance was not established. However, the investigator felt this represented a penalty for maintaining MODEL flexibility as opposed to structuring the MODEL too greatly.

No discernable difference in perspective of validators was detected when comparing the usefulness of the MODEL to their institutions as opposed to other institutions.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to construct from the theoretical literature on administration in general, from decision making studies, and from research studies in the field of simulation, a comparative analysis model which can be used to evaluate educational resource allocation simulation models.

From a review of the literature in Chapters I and II were chosen four characteristics which formed the foundation of the proposed resource allocation simulation comparative analysis model as follows:

- 1, Performance
- 2, Utility
- 3, Time
- 4, Cost. (Academy for Educational Development, 1973, p. 27)

Additionally, six decision making models were reviewed in Chapter II. The models were created by Churchman (1968), Griffiths (1959), Kaufman (1972), Provus (1971), Simon (1960), and Stufflebeam et al., (1971).

Six resource allocation simulation models were discussed

briefly in Chapter II. The six were Resource Requirements Prediction Model 1.6 (RRPM), Comprehensive Analytical Methods of Planning in University/College Systems VIII (CAMPUS), System for Evaluating Alternative Resource Commitments in Higher Education (SEARCH), Temple University Planning Model (TEMPLAN), Nickens Budget Simulator (NBS), and Planning Translator II (PLANTRAN).

The presentation of the resource allocation simulation comparative analysis model (Appendix A) represented the final phase of Chapter II. The linkage of administrative theory of the MODEL was stressed and is considered essential to understanding concepts incorporated in the MODEL.

Chapter III consists of the process referred to as Phase III in the Introduction. Essentially, the MODEL developed in Chapter II was field-tested. Expert opinion was used as the evaluation method.

In Chapter IV, field-testing was accomplished by twelve experts who were designated by the members of the organizations credited with the creation of the six resource allocation simulation models reviewed in Chapter II. Validation was accomplished by using six community college chief executive officers as validators.

Chapter V consists of an analysis of the field-test and validation data presented in Chapters III and IV. The data was analyzed in order to determine if the proposed MODEL could be used for the purposes for which it was designed. Chapter V

concluded with the determination that the proposed MODEL was feasible for use.

Conclusions

As stated earlier in the Chapter, the purpose of this study was to construct and validate a resource allocation simulation comparative analysis model to be used by educational managers to determine the value and applicability of a resource allocation simulation model to be used in their institutions prior to actual implementation of the model.

There are a number of important conclusions which were derived from this research. Specifically:

1. The construction of a single best all purpose resource allocation simulation comparative analysis model may prove to be too narrow for evaluating all simulation models for all institutions.

2. The use of expert opinion as a means of evaluation, when the experiences which qualify the person as expert are centered upon a single resource allocation simulation model, elicits answers obviously influenced by that experience.

3. The use of general, rather than specific, terms in the MODEL leads to confusion of the user.

4. A structured MODEL may be followed more easily than a MODEL leaving greater latitude for interpretation by the user.

5. The MODEL as presented in Appendix B was determined to be acceptable for use by a committee of experts.

Implications For Further Study

The most obvious implication of this study for further investigation would be the implementation of the MODEL in a number of institutions. This process would allow the researcher to move from the theoretical to application. This study would identify problems of implementation not yet identified. Additionally, it would provide additional data related to the readiness of an institution to accept such an evaluation tool. A further use of the study would be to apply the MODEL to institutions of various sizes and make-up. The governance structure of the institution should be considered also in selecting institutions in which to test the MODEL.

A second implication would be to investigate the feasibility of producing a more structured version of the MODEL tailored for use by institutions meeting predetermined criteria such as enrollment, number of faculty, percent of state funding, projected growth, and program structure. In this way the MODEL may be modified to reflect more adequately the particular needs of the user institution.

APPENDIX A

Evaluation Of The Resource Allocation Simulation Comparative Analysis Model

Directions:

The Model is divided into four sections:

- I. Cost
- II. Utility
- III. Time
- IV. Performance

Following each section is a set of specific inquiries designed to provide you maximum flexibility in your evaluation. Additionally, space has been provided for you to evaluate the Model in its entirety. Comments are welcome at any point.

I. COST

Preliminary Costs

1. What is the present commitment of the institution to data processing in terms of personnel, rental of equipment, capital investment in equipment, and facilities dedicated to data processing?
2. What is the level of expertise needed by data processing personnel to implement and maintain a resource allocation simulation model? Is this level of expertise available from within the institution? If not, how much will it cost to bring a new person into the organization or, bring presently employed personnel up to this level of expertise?
3. What percentage of the current operating budget is presently designated for data processing? (Include all costs associated with the function such as personnel), maintenance, rental, depreciation, and consumables.) Will this percentage change significantly with implementation? How much and in what areas?

4. Is institutional data model processable? That is, are institutional facts and figures readily transferable into model understood input? Will model implementation necessitate an analysis of data flow within the institution? Is historical data, which is necessary to validate model outcomes, in processable form?
5. Will it be necessary to acquire resources from outside the institution to install the model? If so, what are the costs involved? Is this type service included in the cost of the model?

System Maintenance Costs

1. Will the use of the model increase significantly the consumption of consumable computer service supplies such as paper, cards and tape?
2. Is the cost of maintenance included as part of the resource allocation simulation model cost? If not, is a service contract available?
3. Will special forms be necessary for input and output of data to and from the model?
4. Is the model flexible enough to accept new versions of the model, and changes of computer hardware? If so, how much will these future changes cost?

Evaluation

- A. Are the questions appropriate?

Yes _____ No _____

Comments: _____

- B. Would you have asked other questions of a similar nature?

Yes _____ No _____

If yes, please delineate: _____

C. Are the questions too general?

Yes _____ No _____

Comments: _____

D. Are the questions too specific?

Yes _____ No _____

Comments: _____

E. Do you envision spin-off questions as a result of the questions asked?

Yes _____ No _____

If yes, please delineate: _____

II. UTILITY

1. Will there be institution-wide participation in the modeling process?
2. Is the input/output of the model so detailed and intridate that it may alienate users unaccustomed to computer jargon and methods of operations?
3. Is the model accessable to those desiring to participate?
4. Is the model flexible enough to accommodate various levels of user sophistication?
5. Is the model flexible enough to accommodate changes in computer configuration, institutional organization structure, successive iterations of the model design, and advanced user sophistication?
6. Does the success or failure of the model depend upon the presence and continued concern of one or more technically qualified persons?

Evaluation

- A. Are the questions appropriate?

Yes _____ No _____

Comments: _____

- B. Would you have asked other questions of a similar nature?

Yes _____ No _____

If yes, please delineate: _____

- C. Are the questions too general?

Yes _____ No _____

Comments: _____

- D. Are the questions too specific?

Yes _____ No _____

Comments: _____

- E. Do you envision spin-off questions as a result of the questions asked?

Yes _____ No _____

If yes, please delineate: _____

III. TIME

Installation time

1. From the date the contract is signed for purchase or rental of the model, how many days will elapse before the first usable model output is produced?

2. To what extent will institutional management be disrupted if the model installation is not completed on time?

Model processing time

1. Is model processing time acceptable in relation to management data needs?
2. Will the model require the complete dedication of computer equipment in order to accomplish its task in a timely manner?

Manpower commitment

1. In terms of available manhours, how much time must be dedicated to the model? This should include maintenance as well as actual time the model is operating.
2. Will additional personnel be needed in order to operate the model?

Evaluation

- A. Are the questions appropriate?

Yes _____ No _____

Comments: _____

- B. Would you have asked other questions of a similar nature?

Yes _____ No _____

If yes, please delineate: _____

- C. Are the questions too general?

Yes _____ No _____

Comments: _____

D. Are the questions too specific?

Yes _____ No _____

Comments: _____

E. Do you envision spin-off questions as a result of the questions asked?

Yes _____ No _____

If yes, please delineate: _____

IV. PERFORMANCE

1. Is the array of decision alternatives produced adequate?
2. Are the decision alternatives produced too esoteric or, conversely, too general?
3. Are the decision alternatives capable of implementation?
4. How well do the decision alternatives interface with stated institutional goals and objectives?

Evaluation

A. Are the questions appropriate?

Yes _____ No _____

Comments: _____

B. Would you have asked other questions of a similar nature?

Yes _____ No _____

If yes, please delineate: _____

APPENDIX B

Resource Allocation Simulation Comparative Analysis Model (MODEL)

I. PERFORMANCE

1. Does the model produce an adequate number of understandable alternative courses of action (decision alternatives) which may assist the institution in attaining a predetermined goal or objective such as a balanced budget?
2. Are the decision alternatives capable of implementation?
3. How well do the decision alternatives interface with stated institutional goals and objectives?

II. UTILITY

4. Will personnel throughout the institution have access to and be afforded an opportunity to participate in the modeling process?
5. Is the input/output of the model so detailed and intricate that it may alienate users unaccustomed to computer jargon and methods of operations?
6. Can the model be used with little difficulty by persons of varying levels of technical expertise in the data processing field?
7. Can the model be modified to accommodate changes in computer hardware configuration, institutional organizational structure, successive iterations of the model design, and advanced user sophistication?
8. Does the success of the model depend upon the presence and continued concern of one or more top level administrator or technically qualified computer personnel?
9. How similar is the output of the model to the format of current institutional data reports? If dissimilar, can they be correlated easily?

III. TIME

10. From the date of contract, how many days are anticipated to elapse before the first useable model output is produced?
11. Will institutional management be disrupted if the model installation date is extended? Will this uncertainty require the institution to maintain a dual set of data to compensate for the possibility of late installation?
12. Is model processing (turnaround) time acceptable in relation to management data needs?
13. Will the model require the complete dedication of computer equipment in order to accomplish its task in a timely manner?
14. How many workhours, by personnel pay grade or level of classification, will be required to operate the model? This should include model preparation, maintenance, and normal operations.
15. Will additional personnel be needed in order to operate the model?

IV. COST

16. What is the present dollar commitment of the institution to data processing in terms of personnel, rental of equipment, capital investment in equipment, and physical facilities dedicated to data processing? Is top level management committed to the concept of data processing as a viable part of modern management theory?
17. What level of expertise, measured in years of experience and level of education, is needed by data processing personnel to implement and maintain the model? Is the level available from within the institution? If not, how much will it cost to bring a new person into the organization or bring a person presently employed up to this level? Can the institution attract and hold qualified personnel?
18. Will the incremental costs associated with model installation increase the budgetary commitment to data processing beyond that considered appropriate by the institution? Is it possible that this same service could be obtained from outside the institution at less cost?

19. Is the institutional data model processable? That is, are institutional facts and figures readily transferable into model understood input? Will model implementation necessitate an analysis of data flow within the institution? If so, how much will it cost to align institutional data flow with input needs?
20. Will it be necessary to acquire personnel or materials from outside the institution to install the model? If so, what are the costs involved? Is this type service included in the cost of the model?
21. Will the use of the model increase significantly the consumption of consumable computer service supplies such as paper, cards, tape, and special forms?
22. Is the cost of maintenance included as part of model costs? If not, is a service contract available?

ANSWER SHEET FOR MODEL EVALUATION

MY INSTITUTION

ALL INSTITUTIONS

Question Number	No Use	Slight Use	Moderate Use	Very Useful	One of the Most Useful	No Use	Slight Use	Moderate Use	Very Useful	One of the Most Useful
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12.										
13.										
14.										

ANSWER SHEET FOR MODEL EVALUATION

MY INSTITUTION

ALL INSTITUTIONS

Question Number	No Use	Slight Use	Moderate Use	Very Useful	One of the Most Useful	No Use	Slight Use	Moderate Use	Very Useful	One of the Most Useful
15.										
16.										
17.										
18.										
19.										
20.										
21.										
22.										

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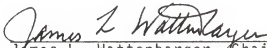
BIOGRAPHICAL SKETCH

Bruce D. Ivey was born in Jacksonville, Florida, April 13, 1945. He was the second of three sons born to Lucy and Marion Ivey. Mr. Ivey attended public school in Jacksonville. After graduation from Andrew Jackson Senior High School in June, 1963, he entered Florida State University in Tallahassee where he completed his B.S. in Finance in April, 1967. Upon graduation, Mr. Ivey entered the U. S. Navy. Upon release from active duty in August, 1973, Mr. Ivey entered graduate school at the University of Florida. While in graduate school, Mr. Ivey was awarded a W. K. Kellogg Fellowship. Additionally, he acted as Administrative Assistant to Dr. James L. Wattenbarger, Director, Institute of Higher Education. He was awarded his M.Ed. in August, 1974 and his Ph.D. in June, 1977.

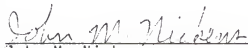
Mr. Ivey is presently employed as Assistant to the President at Broward Community College in Ft. Lauderdale, Florida.

Mr. Ivey is married to the former Miss Terry Lewis of Jacksonville, Florida. They have two children, Gordon, age 8, and Alison, age 6.

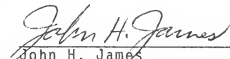
I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


James L. Wattenbarger, Chairman
Professor of Educational
Administration

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


John M. Nickens
Assistant Professor of
Educational Administration

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


John H. James
Associate Professor of
Management

This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

June 1977


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Dean, Graduate School